MAR 8 1990

FLOOD INSURANCE STUDY

VILLAGE OF TREMONT CITY, OHIO

CLARK COUNTY

MAY 17, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER - 390064

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

VILLAGE OF TREMONT CITY,
CLARK COUNTY,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of Tremont City, Clark County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, Louisville District (the Study Contractor) for the Federal Emergency Management Agency (FEMA) under Inter-Agency Agreement No. EMW-87-E-2509, Project Order No. 20. This study was completed in August 1988.

The hydrologic and hydraulic analyses for the Mad River were taken from the Flood Insurance Study for Clark County, Ohio (Reference 1).

1.3 Coordination

Streams requiring detailed study were identified at a meeting in May 1987 attended by representatives of the Study Contractor, FEMA, and the Village of Tremont City.

On June 12, 1989, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Tremont City, Clark County, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Chapman Creek and the Mad River was studied in detail.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through August 1993. The scope and methods of study were proposed to and agreed upon by FEMA and Village of Tremont City.

2.2 Community Description

The Village of Tremont City is in north-central Clark County in midwestern Ohio and is surrounded by the unincorporated areas of the county. It is approximately 20 miles northeast of Dayton, Ohio, and 45 miles west of Columbus, Ohio. The Village of Tremont City is served by State Route 560 and the Grand Trunk Western Railroad. The 1980 population of the Village of Tremont City was reported to be 374 (Reference 2).

The climate of the area is temperate, with warm summers and moderately cold winters. The average annual temperature is 49 degrees Fahrenheit. Annual precipitation over the area varies from about 37 to 40 inches and is well distributed throughout the year (Reference 3).

The Mad River lies in the west-central part of Ohio and passes through or into Logan, Champaign, Clark, Green, and Montgomery Counties. The river rises from a headwater elevation of approximately 1,200 feet National Geodetic Vertical Datum of 1929 (NGVD) near the City of Bellefontaine in Logan County and flows generally south and southwest to its confluence with the Great Miami River at Dayton. Chapman Creek is a minor tributary to the Mad River and flows along the southern edge of Tremont City.

2.3 Principal Flood Problems

Flooding problems in Tremont City are due primarily to overflow of Chapman Creek and the Mad River. Flooding from Chapman Creek usually affects the area between the creek and Main Street. Flooding may occur during any season of the year, but its potential and severity are increased during periods of melting snow.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

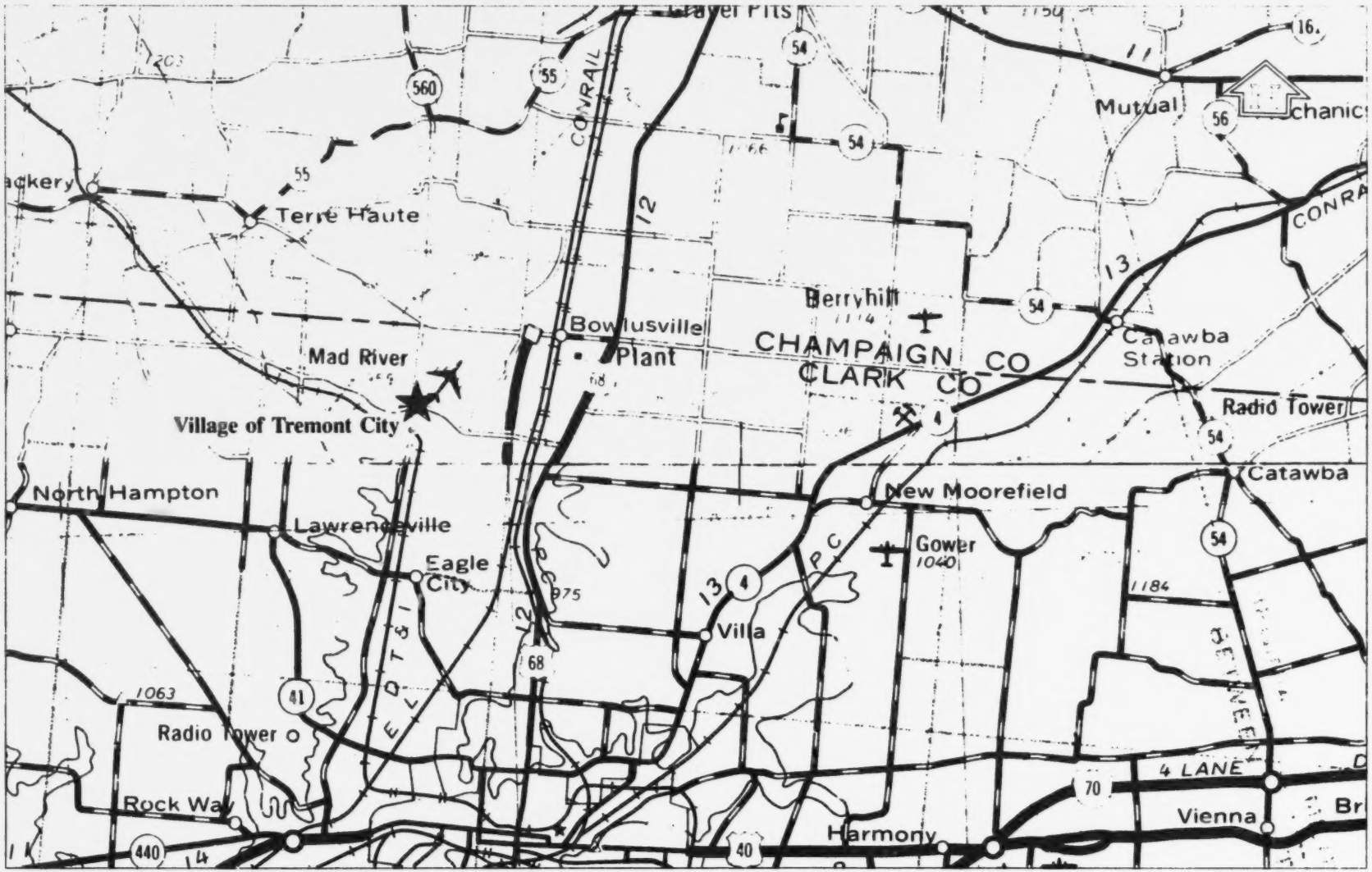


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF TREMONT CITY, OH
(CLARK CO.)

APPROXIMATE SCALE
2 0 2 4 6 MILES

VICINITY MAP

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40-percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60-percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

No existing U.S. Geological Survey (USGS) gaging stations are located on Chapman Creek. Consequently, a regional study using data from nearby USGS gaging stations was performed to develop a discharge-drainage area frequency curve for Chapman Creek. Data from three USGS gaging stations located on the Mad River were used to develop a discharge-drainage area frequency curve for the Mad River in the vicinity of Chapman Creek. Floodflow frequency data at all gages were determined using "Guidelines for Determining Flood Flow Frequency," (Reference 4).

The 100- and 500-year discharges for the Mad River were derived from information recorded at various gaging stations using methods presented in Bulletin No. 45 (Reference 5).

Peak discharge-drainage area relationships for the 100-year flood of Chapman Creek and the 100- and 500-year floods of the Mad River are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 100-YEAR	500-YEAR
CHAPMAN CREEK			
at mouth	24.4	5,600	N/A
just upstream of confluence of Panther Creek	22.4	5,300	N/A
MAD RIVER			
just downstream of confluence of Chapman Creek	288	18,300	24,200

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Water surface elevations for floods of the 100-year recurrence interval were computed using the HEC-2 step-backwater computer program (Reference 6). Cross-section data were obtained from field survey and topographic maps (Reference 7). Cross-section data used in the analysis of the Mad River were obtained from aerial photographs (Reference 8).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") for water-surface computations were assigned on the basis of field inspection of channels and floodplains. Roughness values for the main channel of Chapman Creek ranged from 0.05 to 0.055 and overbank roughness values ranged from 0.045 to 0.050. Roughness values for the main channel of the Mad River ranged from 0.03 to 0.035 and overbank roughness values ranged from 0.04 to 0.12.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 7).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for Chapman Creek lie outside the corporate limits. The floodway for the Mad River lies outside the village.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

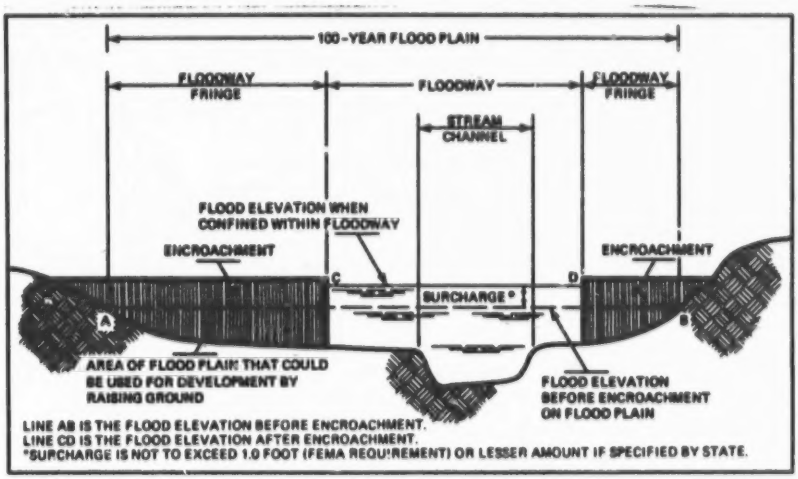

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
CHAPMAN CREEK								
A	0.73	816	1079	5.2	953.7	953.7	954.2	0.5
B	0.79	713	1703	3.3	955.7	955.7	956.7	1.0
C	0.90	426	956	5.9	958.2	958.2	958.4	0.2

[1]MILES ABOVE MOUTH
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF TREMONT CITY, OH
(CLARK CO.)

FLOODWAY DATA

CHAPMAN CREEK

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Flood Insurance Study published for Clark County, Ohio, assumes backwater effects on Chapman Creek in the southern portion of Tremont City. The findings of this study do not agree with this assumption. On the east side of the city, the 100-year flood delineations for the Mad River have been revised based on more detailed topographic maps.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Village of Tremont City (Reference 9).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604-2698.

Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the map repository of flood hazard data located in the community.

9.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Study, Clark County, Unincorporated Areas, Ohio, July 1987.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., January 1982.

3. Ohio Department of Natural Resources, Division of Land Soils, An Inventory of Ohio Soils, Clark County, Ohio, 1969.

4. U.S. Water Resources Council, Bulletin No. 17A, Guidelines for Determining Flood Flow Frequency, June 1977.

5. Ohio Department of Natural Resources, Division of Water, Bulletin No. 45, Floods in Ohio, Magnitude and Frequency, May 1977.

6. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, April 1984.

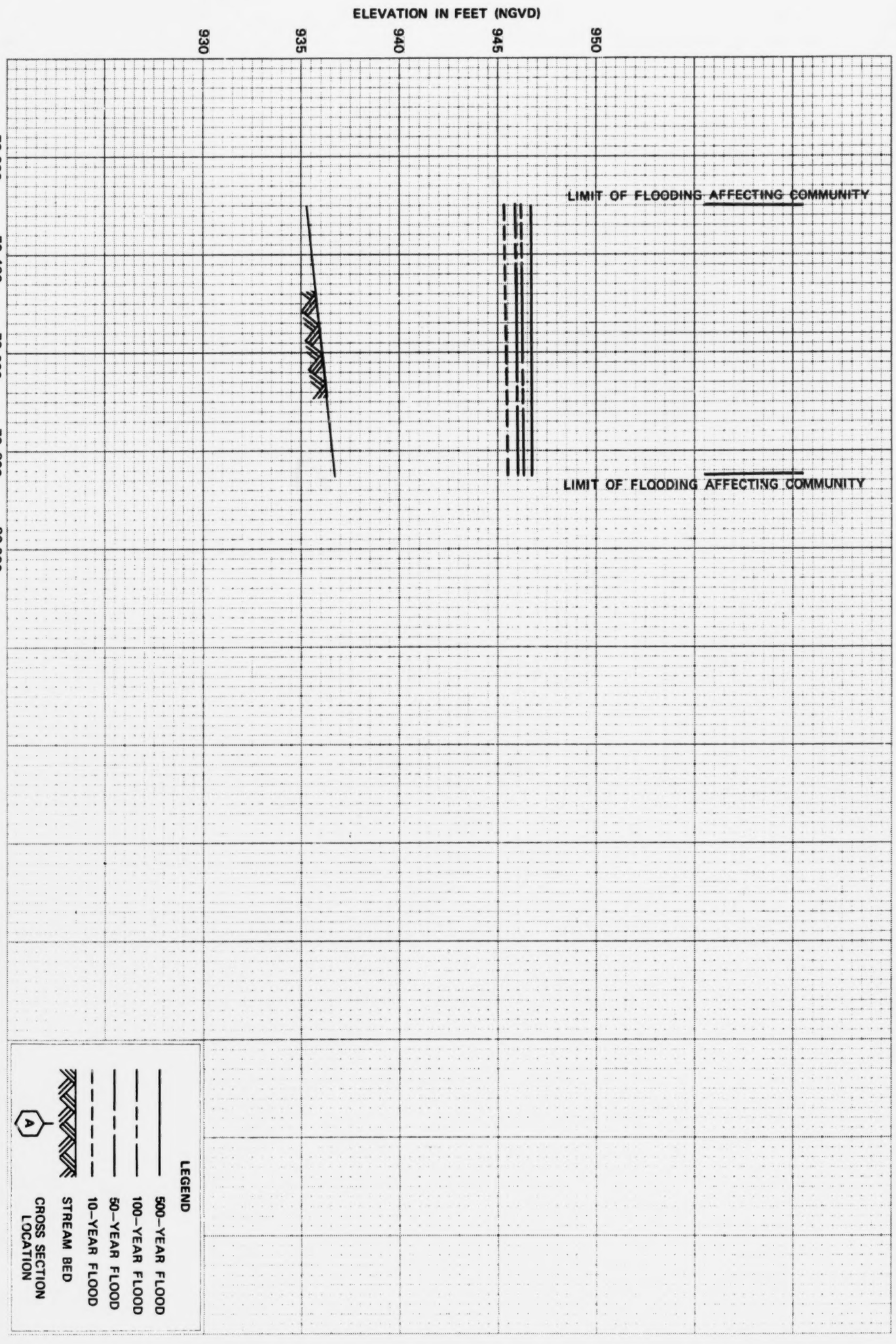
7. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 Feet: Urban West, Ohio, 1961.

8. Photogrammetric Services, Inc., Aerial Photography, Scale 1:7200, November 1983.

9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of Tremont City, Clark County, Ohio, May 1978.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	957.44	U.S. Geological Survey standard disk stamped "1 CMN 1954 957" set in west end of north concrete abutment of Mulberry Street bridge over Chapman Creek
2	0001	965.56	mine spike in standard COE tom plate set in power pole located 20 feet south of intersection of Main Street and Church Road at entrance to Mt. Calvary Cemetary



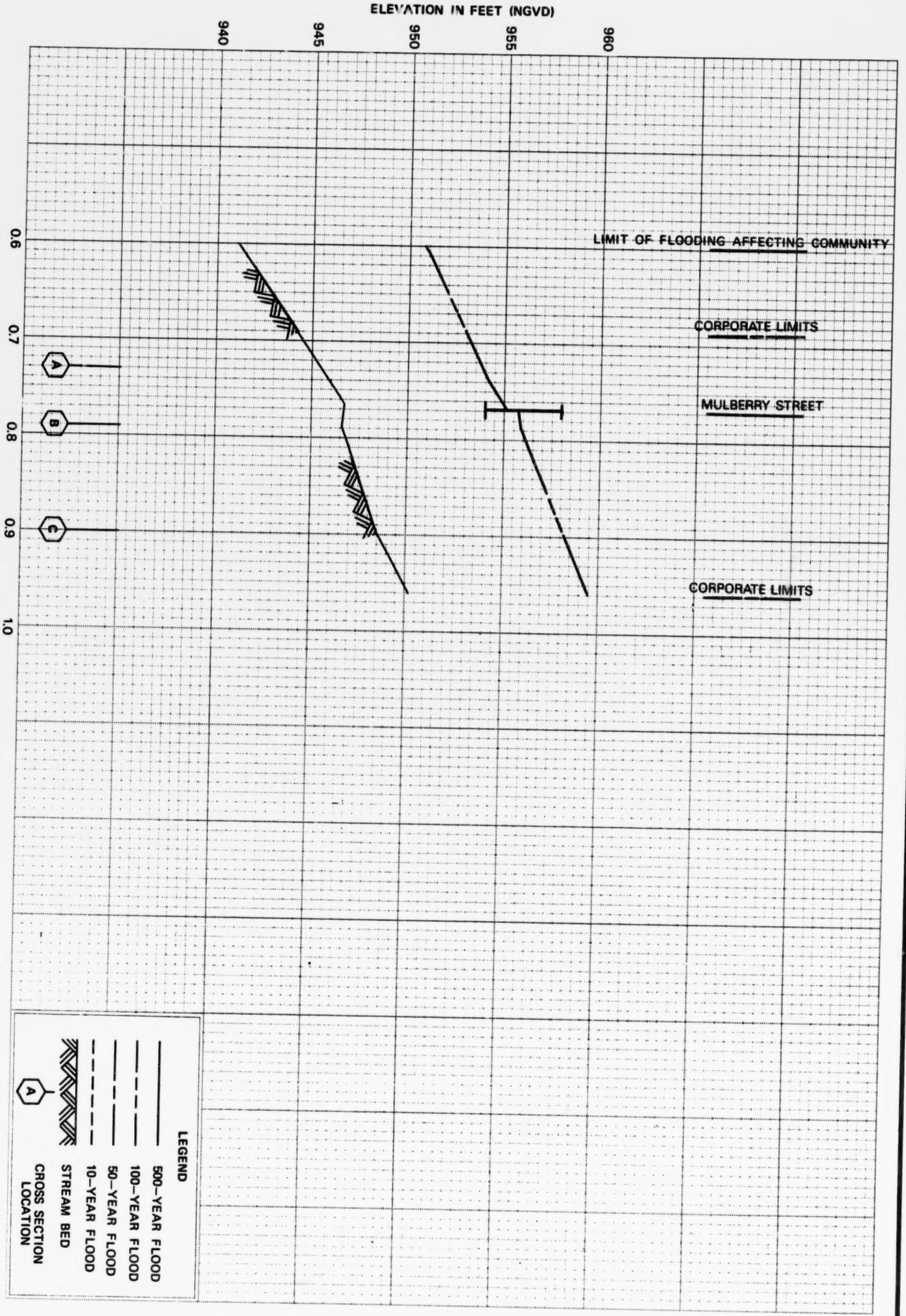
01P

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF TREMONT CITY, OH
(CLARK CO.)

FLOOD PROFILES

MAD RIVER



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02P

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF TREMONT CITY, OH
(CLARK CO.)

FLOOD PROFILES

CHAPMAN CREEK